

Climate related variation in Puget Sound density and oxygen

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We investigate fluctuations in deep seawater density and dissolved oxygen concentrations, as revealed by annual anomalies relative to an eleven year mean (Oct 1992-Sep 2003) from monitoring data at various locations in Puget Sound. This time period includes several El Niño events (1993, 1994, 1997), one La Niña event (1995), and a year of drought with substantially decreased river flows in Washington State (2001). Anomalies were calculated from values over the bottom half of the water column at 17 stations. Our goal is to assess whether trends for increasing hypoxia are obvious, or if climate or other factors appear to be involved. The magnitude of coastal upwelling, solar radiation, and river discharge are examined for possible links to observed density and dissolved oxygen variations. The length and frequency of this data set allows us to begin to probe external forcings that potentially affect Puget Sound water properties, as well as any trends that may be linked to human sources of eutrophication. There is tight coupling between density and river flow. A strong “densification” of Puget Sound seawater is evident, associated with the 2000-2001 drought that has persisted to some degree. There is a weak correlation between low oxygen concentrations and river input, except for three years: 1999, 2000, and 2003. All three years had exceptionally high solar radiation, although the oxygen anomaly was not uniformly in the predicted direction. There was no obvious correlation with upwelling.